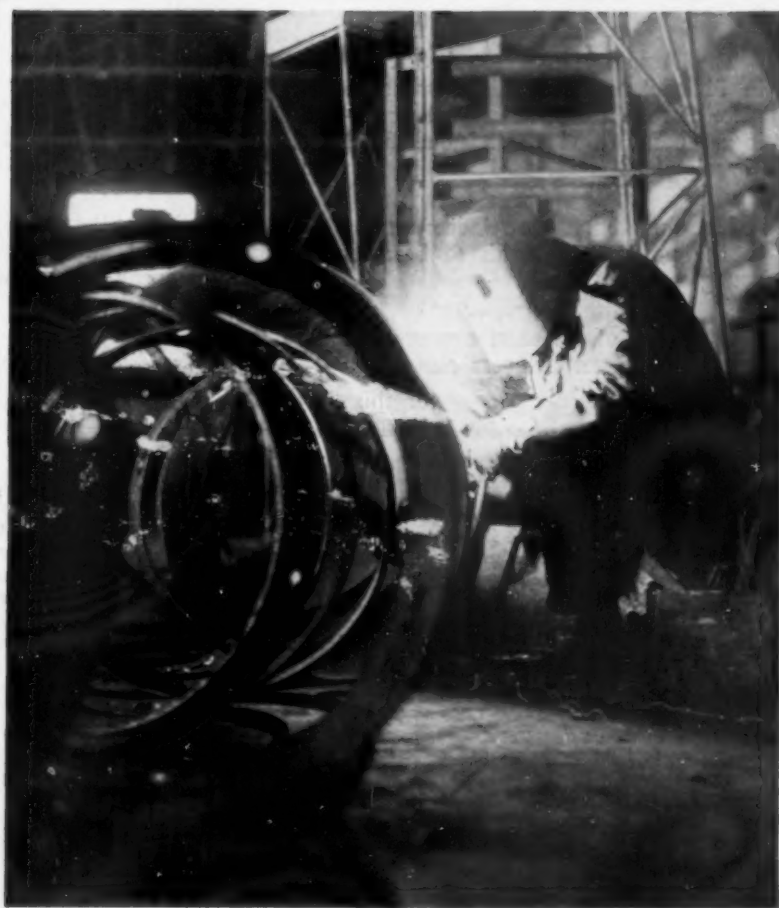


SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE.



APRIL 23, 1932

Industry's Seamstress

See Page 261

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SCIENCE SERVICE PUBLICATION

SCIENCE NEWS LETTER

VOL. XXI

No. 576

The Weekly
Summary ofCurrent
Science

Published by

SCIENCE SERVICE

The Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science.

Edited by WATSON DAVIS

Subscription rates—\$5.00 a year postpaid; two years, \$7.00; 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Back numbers more than six months old, 25 cents.

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Advertising rates furnished on application.

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Publication Office, 1930 Clifton Ave., Baltimore, Md. Editorial and Executive Office, Constitution Ave. at 21st St., N. W., Washington, D. C.

Address all communications to Washington, D. C. Cable address: Scienservc, Washington.

Entered as second class matter October 1, 1926, at the post-office at Baltimore, Md., under the act of March 3, 1879. Established in mimeographed form March 13, 1922. Title registered as trade-mark, U. S. and Canadian Patent Offices.

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DO YOU KNOW THAT

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At the request of the Salvation Army, government nutrition specialists have made a number of suggestions for increasing the variety and nutritive value of meals served to homeless men.

Three stone martens from the mountains of Czechoslovakia have been bought for use at the Government's fur-animal experiment station at Saratoga Springs, N. Y.

A new electrical device, which controls heat for hotbeds, is said to cause plants to take root in half the time normally required.

The Academy of Natural Sciences in Philadelphia has in its museum a piece of rock that bends without breaking; a porous kind of sandstone called "itacolumite."

Like the salmon, the reindeer returns to the place of its birth to bear its young.

Over half of the meat consumed in the United States last year came from hogs.

Felt-coated steel, developed at Mellon Institute of Industrial Research, opens up interesting new commercial possibilities.

Forty years ago diphtheria was one of the most dreaded children's diseases, more than half of the cases being fatal.

The Colorado National Forest has been re-named in honor of President Roosevelt.

Two ruined cities have been discovered in the great desert of southern Arabia, by H. S. Philby, English explorer.

Bats appear to have better control in flight than birds, being able to turn sharply, to stop abruptly, and to fly fast or slow with great flexibility.

With a view to lessening the early-morning noise of rattling milk bottles, a rubber company has devised rubber-covered milk carriers.

Glazed building bricks are being made in lavender, yellow, and pink.

WITH THE SCIENCES THIS WEEK

CURIOSITY-AROUSING questions are prepared concerning the most interesting and important news in each issue. These questions should be a mental stimulant for the adult reader and a boon to the teacher who uses the Science News Letter to add zest to her classroom instruction.

Book reference in *italic type* is not the source of information of the article, but a reference for further reading on the subject of the article. Books cited can be supplied by Librarian, Science Service, at publisher's price, prepaid in U. S.

ARCHAEOLOGY

How does the Pyramid of Cholula compare in size with the Pyramid of Cheops? p. 261
How does the sun-hole calendar operate? p. 267

BOTANY

What is the "One in Ten" rule for wild flower picking? p. 260. *Fieldbook of American Wild Flowers*—P. Schuyler Mathews—Putnam, 1927, \$3.50.

CHEMISTRY

How many isotopes has copper? p. 256. *The Story of Copper*—Watson Davis—Century, 1924, \$3.
What is the formula for rotenone? p. 255. *Insecticides and Fungicides*—O. G. Anderson and F. C. Roth—Wiley, 1923, \$3.

COSMOGONY

In the new solar theory, what causes the sun to rotate? p. 258.

INVENTION

What did General Washington say to John Fitch about steam-propelled boats? What was the difference between the methods of Fitch and Rumsey regarding the application of steam to vessels? p. 262

MANUFACTURING

What new use has been found for soy bean oil? p. 261

MEDICINE

How many people in America die from cancer each year? p. 261. *Cancer*—Albert Soiland—Appleton, 1928, \$1.50.
What causes the brain disease of horses which has been attacking man? p. 255

METEOROLOGY

What place have balloons on the Ice Patrol boat, Pontchartrain? p. 260. *Meteorology for Aviator and Layman*—Richard Whatham—Stokes, 1930, \$3.

METEOROLOGY-VOLCANOLOGY

What happens if volcanic ash gets above the highest cloud level? p. 256. *Volcanoes*—G. W. Tyrrell—Holt, 1931, \$1.25.

PHYSICS

What is the average duration of an atom's "excited state"? p. 260.

PHYSICS-PHOTOGRAPHY

What is Kirchhoff's Law? p. 257.

PHYSIOLOGY

What is the chief difference between the fire-fly's light-producing process and the reaction involved in ordinary respiration? p. 264

PUBLIC HEALTH

Who discovered thallium? What are its effects on animals? p. 256

ZOOLOGY

Is the mole blind? p. 267.

CHEMISTRY

Most Effective Insect Killer Yields Formula to Chemists

Rotenone, Obtained from Tropical Plants, May Be Made In Laboratory Following Discovery of Its Composition

ROTENONE, most effective insect killer yet discovered, has yielded the secret of its chemical makeup to three chemists of the U. S. Department of Agriculture, Dr. F. B. LaForge, Dr. H. L. Haller and L. E. Smith.

Rotenone is a white crystalline substance, obtained from the roots of tropical plants belonging to the pea family. Its principal commercial source at present is the East Indian vine derris; but a South American shrub, cubé, has also been shown to contain it in paying quantities.

Rotenone contains only three chemical elements, carbon, hydrogen and oxygen, in the ratios of 23, 22 and 6. This is expressed by the "linear" formula $C_{23}H_{22}O_6$. The "structural" formula, which shows organic chemists just where each atom of the molecule is located, is reported to be quite complex.

The three chemists who conquered rotenone's secret are lauded by Dr. C. A. Browne, assistant chief of the Bureau of Chemistry and Soils, as winners over keen competition by German and Japanese chemists, who also were hard on the trail of its formula, and had been working for some time before the Americans started.

Chemists always want to know the exact formula of a compound that has been found valuable, because then they may be able to learn how to put it together more cheaply out of coal tar or some other low-priced material, instead of extracting it from expensive imported plant sources. The three chemists are now at work on this problem, and have already succeeded in assembling several compounds that might be said to represent half-way steps in the reconstruction. There is, of course, always the possibility that some entirely new synthetic product may be put together that will be even better than the natural prototype.

Rotenone, for all its present highly scientific exploitation, was originally a gift to white men by naked savages. In both the East Indies and in South America, the plants containing it were used as fish poisons. Though poi-

soned, the fish were still good to eat.

White man tried the poison on himself and on warm-blooded animals and found it harmless. He tried it on insects, and found it killed them with amazing quickness and economy. Now rotenone is used on a large scale in many widely-advertised insecticides. It is in the hope of making cheaper and better insect-killers that the Department of Agriculture chemists are carrying on their research.

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MEDICINE

Men Attacked by New Brain Disease of Horses

TWO CASES, one of them fatal, in which men have apparently been afflicted with a newly-discovered brain disease of horses and mules have been reported by Dr. Karl F. Meyer of the George Williams Hooper Foundation for Medical Research, University of California, to the American College of Physicians.

The two cases occurred in cattlemen

who had been caring for horses afflicted with the equine form of the disease. Dr. Meyer could not prove conclusively that they had suffered from the same disease because he was unable to examine the brain of the man who died. But from the symptoms and the fact of their close contact with the sick horses, he felt sure they had contracted the disease from the animals.

The equine disease, called encephalomyelitis, first appeared in California during the summer of 1930. During 1930 and 1931 about 6,000 horses died. Dr. Meyer expects the disease to occur in epidemic form again this season when the warm weather returns, as several cases have already been reported from the San Joaquin Valley. The malady is caused by the type of germ known as a virus, which attacks the brain and spinal cord of the animal. It is apparently identical with the so-called "cerebro-spinal meningitis" which has been reported in various parts of the United States during the past 70 years, Dr. Meyer said.

An attack of the disease, even so slight as to escape notice, seems to give the animal immunity, that is, to protect it from subsequent infection in the majority of cases. Investigations at the Hooper Foundation are being made with the hope of producing a serum that may be used in treating the animals or a preparation that will confer immunity on them. Encouraging results have been had in a small number of cases.

Science News Letter, April 23, 1932



—Courtesy National Society for Prevention of Blindness.

SAVING YOUNG EYES

Children with seriously defective vision need no longer be handicapped in the matter of their education. Through special sight-saving classes, they can receive a normal amount of training with a minimum of eye-strain. Books in large type, adjustable desks located advantageously, carefully measured lighting, and special teaching methods are used to achieve this end.

VOLCANOLOGY—METEOROLOGY

Recent Volcanic Eruptions May Affect World Weather

SOUTHERN South America may get a cold, wet season as a result of the recent volcanic eruptions in the Chilean Andes, if the experience of North America twenty years ago is any criterion.

In 1912, one of the greatest of Alaskan volcanoes, Katmai, literally blew its top off, hurling vast quantities of fine volcanic ash high into the air. This drifted in the upper atmosphere, the particles serving as nuclei for cloud particles. The result was that over huge stretches of territory in the United States proper the sun was hardly seen at all that summer.

The after-effects of the Katmai eruption were confined to the Northern Hemisphere, and disappeared within a year or so. But a generation earlier, in 1883, there was an eruption whose effects were noticed all over the world, and lasted for several years. This was the explosion of the East Indian volcano Krakatau, which destroyed over 36,000 lives. This eruption threw so much ash—estimated at 4.25 cubic miles—so high into the air that it drifted entirely round the earth, and is credited with causing the unusual red sunsets observed for several years after the eruption.

Whether the recent South American outbreak, which was considered of major magnitude, will have any such effects as these will depend largely on how high the volcanoes have cast their ash vomitings. If they have got any large quantity of ash above the level of the highest clouds, about ten miles up, it may drift indefinitely, cross the equator and make its effects felt in the Northern Hemisphere, said Prof. W. J. Humphreys of the U. S. Weather Bureau in response to a Science Service inquiry. At a somewhat lower elevation, the ash will still drift, but, caught in the Southern Hemisphere air circulation, it will not invade the supra-equatorial lands. And if the ejecta have not been cast above cloud level, Prof. Humphreys continued, they will be caught by condensing water and soon be washed entirely out of the air.

Although volcanologists themselves freely use the term "volcanic ash," they are careful to point out that it is not an accurate usage, if by "ash" one under-

stands material that has been exposed to fire. For there is no fire in a volcano, except such small incidental flames as are caused by the ignition of minor amounts of inflammable matter such as hydrogen and sulfur. The appearance of great flames above the volcano is caused by the reflection of the glowing lava on the clouds above; and the "ash" is simply lava that has been blown into fine froth and finally shattered into particles by the explosive action of the eruption.

Science News Letter, April 23, 1932

PUBLIC HEALTH

Restriction Urged On Use Of Poisonous Thallium

THE METAL thallium is apparently a dangerous poison. Therefore its use in human medicine and in wholesale poisoning activities against rodents and other lower forms of life should be restricted until more is known about its action and the habits of the animals against which it is used, warns Dr. Marcus Ward Lyon, Jr., of South Bend, Ind., in a note in *Science*. Similar warning against the use of thallium as a rat poison has recently been issued.

Numerous deaths have followed the

use of thallium as a depilatory for cosmetic purposes and in the treatment of ringworm of the scalp, Dr. Lyon points out. Several fatal cases of thallium poisoning have also been reported from the use of thallium-poisoned grain for the destruction of ground squirrels. Thallium is also poisonous to plant life.

"The amount of thallium distributed in poisoned grain for destroying rodents and other forms of life is quite appalling," declares Dr. Lyon.

He questions whether there is any likelihood of the thallium-treated grain being placed in the same situation year after year, such as might happen if old burrows are occupied by incoming ground-squirrels. In that case, he suggests there would be danger of causing patches of soil sterility.

Thallium was discovered by Sir William Crook in March, 1861. The new element was supposed to belong to the sulfur group until 1862 when Lamy of Lille isolated it, showed it to be a metal, and described its properties.

During his study of thallium, Lamy experienced weakness and pains in the legs which made him suspect it of being poisonous. He showed that this was the case by studying its effects on animals. It was later found useful in treating colitis and tuberculosis, and in this connection its depilatory effect was accidentally discovered when the patients' hair began falling out. Besides total loss of hair, thallium poisoning may produce such symptoms as weakness, leg pains, neuritis, mental disturbances, kidney involvements, excess salivation, heart palpitation, and visual disturbances.

Science News Letter, April 23, 1932

CHEMISTRY

New Copper Isotope Revealed By Magneto-Optic Method

A NEW kind of copper has been discovered by Prof. Edna R. Bishop of the Alabama Experiment Station, in a further application of the powerful magneto-optic method of analysis which was recently used in the discovery of the new chemical elements virginium and alabamine. Prof. Bishop was herself one of the discoverers of the new element alabamine.

The new copper is an isotope differing only in weight from the usual type of copper atoms. Isotopes of weights 65 and 63 had already been discovered

by Prof. F. W. Aston of Cambridge University, England. Analyses of copper salts from various sources and of different combining powers have all now shown a third isotope in the Allison apparatus. It is not yet possible to say what is the weight of the new kind of copper atom beyond the fact that it is less than 63.

This discovery fits the prediction by Prof. Harold C. Urey of Columbia University of a new copper isotope of weight 61.

Science News Letter, April 23, 1932



—Courtesy Carnegie Institution of Washington.

THE FLAT-IRON PHOTOGRAPH

—on the right was made with ordinary light while the one at the left was made in total darkness with a plate sensitive to infra-red rays. In taking the latter, the iron was heated in the usual way and produced the picture by its own radiation. Note the appearance of the ink spots in the two pictures.

PHYSICS-PHOTOGRAPHY

Heat Rays Take Picture Of Ink-Spotted Flat-Iron

PHOTOGRAPHIC plates that record invisible heat rays have allowed Dr. Harold D. Babcock of the Mount Wilson, Calif., Observatory of the Carnegie Institution of Washington to make a new test of the famous law of heat emission and absorption that Kirchhoff derived in 1859.

A used electric flat-iron on whose smooth working surface some black drawing ink was spotted was photographed with an ordinary photographic plate and with one of the new infra-red sensitive photographic plates recently developed by the Eastman Kodak Company. In the photograph made by ordinary visible light, the ink spots appeared black as they did to the eye. But in the heat rays photograph the lamp-black ink spots showed up brighter than the rest of the hot iron, indicating that they were giving off heat faster than the smooth metal.

This verifies Kirchhoff's law, one of the broad generalizations of physics, which says, in effect, that things which readily absorb a large amount of the light and heat that fall on them are good radiators while those that absorb little give off small amounts.

The heat sensitive plates used must be kept in an ice-box until used in order to prevent ordinary room temperature from fogging them.

Science News Letter, April 23, 1932

CHEMISTRY

German Scientist Confirms Existence of Neutrons

BOTH NEUTRONS and gamma rays are given off when the metal beryllium is bombarded with the hearts of helium atoms, Dr. F. Rasetti of the Kaiser Wilhelm Institute for Chemistry in Berlin, Germany, has concluded after repeating the experiments of Drs. W. Bothe and H. Becker, German physicists, Mme. I. Curie-Joliot and Prof. F. Joliot, French experimenters, and Dr. J. Chadwick of Cambridge, England, which had been interpreted both as artificial radio-activity and as demonstrating the existence of the neutron, close combination of electron and proton. The neutrons are detected most readily in an ionization chamber and the gamma rays, like those from radium, are detected by a counting tube.

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BOTANY-PHYSIOLOGY

Drug Made From Indian Plant Produces Movie-Like Visions

DRIED specimens of an Indian plant, from which a drug can be made that produces magnificent and terrifying visions in motion picture form, have recently been received at the U. S. National Museum. The plant, known as yage, comes from southeastern Colombia.

Indians in the region where the plant grows make a beverage by boiling it for a day in earthenware vessels. Leaves and young shoots of certain other plants are added and a sort of liquid, like the syrup of sugar cane, is obtained, according to Guillermo Klug, of Iquitos, Peru, who sent the plants to the museum.

After about two pints of the liquid have been consumed over a period of two hours, the continuous, movie-like illusions are experienced by the drinker. Under the influence of the drug, all objects appear to have a strangely blue halo about them.

The Indian addict soon falls into a profound sleep during which he is in a state of complete insensibility and anesthesia. At this point his subconscious mind conjures up swiftly moving

dreams of extraordinary precision and clearness. The intoxicated person, so Mr. Klug says, is given the power of double vision and of seeing things at a distance, like mediums in a trance. Upon awakening the Indian retains a clear impression of his fantastic experiences. It may be, Mr. Klug states, that the drug has the power of developing psychic faculties.

The drug was taken experimentally by a Colombian scientist, who reported the unusual hallucinations and of being able "to see objects in the midst of the most complete obscurity." Yage was also found to produce extreme excitation in horses and dogs, a large dose causing them to lose their equilibrium. The drug was also reported by persons of education as being a complete cure for malaria.

Notes giving information on yage have been prepared by C. V. Morton of the U. S. National Museum and communicated to the Washington Academy of Sciences.

Science News Letter, April 23, 1932

COSMOGONY

Lost in Space: Our Sun's Twin

New Theory Sees Origin of Solar System in Star That Whirled Itself Into Dumb-bell Shape, Then Tore in Two

By D. LINDSAY WATSON

MILLIONS of millions of earth-like planets exist throughout the heavens.

Living things, even intelligent beings like ourselves, must be present on many of these. Our little company of life is then, not alone in the universe but is one of a vast number of colonies which have arisen where physical conditions are favorable.

This possibility of life scattered everywhere throughout the universe is made likely by a new theory advanced by Dr. Ross Gunn of the U. S. Naval Research Laboratory. Unlike his fellow-scientists, he believes that our solar system was formed by the catastrophic splitting of a large star, half of which became our sun while the other half lost itself in space.

This cosmic cell-division must be happening all the time among the stars. The double stars which form twenty-five per cent. of all the bodies we can see in the heavens, Dr. Gunn has shown, were born in exactly the same way. A planetary system is, therefore, the result of an orderly evolution—not just lucky chance.

The present accepted view among astronomers holds that the earth was formed in the course of a very rare accident. Another larger star is supposed to have collided with our own sun.

This is extremely unlikely. The stars are so very far apart that such a collision could have occurred only once in a million, million, million years. Probably not more than a thousand encounters of this kind have taken place in the whole history of the universe. If this theory is true the probability of there being other inhabited worlds is small.

On the other hand, if Dr. Gunn is right, many groups of planets similar to our own have been formed and it is not unreasonable to suppose that life has developed on these bodies as it has on the earth.

Our sun, according to the new idea, was once a liquid star about one and a half times as large as it is now. Electromagnetic forces made it rotate with

constantly increasing speed until it could no longer hold together. It then burst in two. The fragments skyrocketed apart, one becoming the sun and the other going off into the depths of space never to be heard of again. Before saying goodbye, however, the sun and its departing mate left a cigar-shaped ribbon of debris between them, which later cooled and formed the planets.

The story of the creation in the first chapter of Genesis can be interpreted as agreeing with Dr. Gunn's ideas. Verses six and seven read:

"And God said, Let there be a firmament in the midst of the waters and let it divide the waters from the waters.

"And God made the firmament, and divided the waters which were under the firmament from the waters which were above the firmament: and it was so."

Fascinating Possibility

The resemblance of this old Hebrew account to Dr. Gunn's is still closer when we read for the word "firmament" its literal meaning, expansion, and read "waters" as fluid (or gas).

It is too early, yet, to speculate when and how we shall communicate with the near-human inhabitants of these earth-like bodies in distant space. However, this possibility is a fascinating one to a generation of men just becoming conscious that no limits can be set to human achievement.

Two new ideas have been introduced by Dr. Gunn's view of the birth of the solar system—his explanation of the kind of force that caused the old parent star to rotate to its destruction and his reasons for the excessive speed with which the two halves shot apart.

Old theories of this spin have been unable to explain how the sun could have come to turn so fast that some of its matter blew off at its equator.

Experiments with the discharge of electricity in vacuum tubes have supplied the clue that was missing. It is possible to explain a star's rotation, Dr. Gunn has found, not on gravitational grounds, but because of the operation of electric and magnetic forces on the electrically charged atoms known to exist in large quantities in hot stars.

Thus the present rotation of the sun, a problem which had baffled physicists and astronomers, has been given a new explanation by what Dr. Gunn calls an "electromagnetic wind." He has been able to explain not only the average speed of the sun's rotation but also the fact that it turns at a different speed at its equator from that observed at the poles.

The same theory applied to a larger mass such as the imagined parent of our sun, shows that the speed must have increased until the huge star made a complete turn in about six hours. Spinning still faster, the primeval star became unstable. It flattened into an oval shape; later assumed the form of an unequal dumb-bell, and eventually split in two—still spinning.

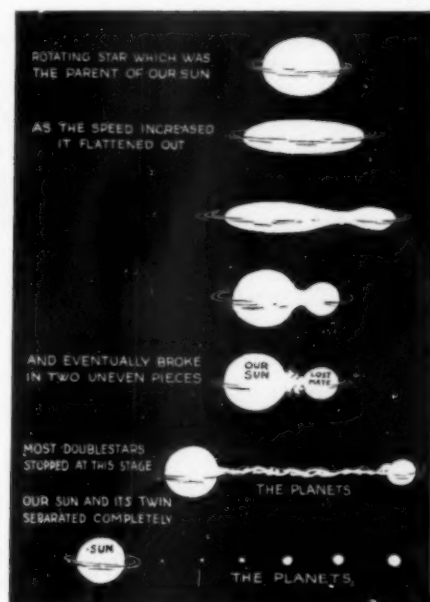
Now the inner surfaces of the two suns were temporarily much hotter than the outsides that had formed the skin of the parent star. Such hot surfaces must have radiated their heat and matter out much faster than the rest of the surface. This is just the way a sky-rocket works. By shooting exploding gases out behind it, the rocket flies forward.

Our sun and its departing mate pushed themselves apart like a couple of



DR. ROSS GUNN

—of the U. S. Naval Research Laboratory, whose new theory revives the possibility of the existence of inhabited worlds beside our own.



SOLAR TAFFY

The new theory about the origin of our solar system, showing how the sun increased its speed, split in two, and sent out a "twin"; and how the planets were formed from the trailing streamer of matter connecting the two bodies.

skyrockets. While they were still close together, however, large bulges or tides were raised on each of the twins by the gravitational pull of the other. Our own moon pulls the sea around on the surface of the earth in exactly the same manner.

These tides, together with the swirling motion, caused the shooting out of a long stem of matter between the two new born suns. After a while this cooled and gathered together into lumps. These lumps were the planets, one of them the earth.

A Heavenly Divorcee

It was all over in a few hours. By this time our sun's mate was dashing off to some distant corner of the heavens, leaving King Sol custody of the children and, so far as Dr. Gunn knows, leaving no address by which we can hope to reach her. Whether the departing divorcee also carries around with her another retinue of planetary brats, there seems no way of knowing now.

In Dr. Gunn's words:

"Just as the parent liquid star divided into two component stars, tidal and centrifugal forces broke off small sections and these cooled and formed the planets. Immediately after the planets were formed, the same tidal forces broke off even smaller sections, the planetary satellites or moons. The entire solar system was compact when formed. The

lost component, however, attracted the newly formed planets and succeeded in carrying them well away from the sun. Thus the present open structure of the system is due to the original presence of the lost mate of the sun."

Dr. Gunn is a late comer in a field which has occupied many distinguished minds. Contemporary astronomers are to be pardoned if they regard his revolutionary doctrine with some hesitation, if not hostility.

Accepted by scientists until the beginning of the present century was the notion that the sun and planets were condensed by cooling and contraction from a luminous cloud of gas spread throughout the space occupied at present by the whole solar system. As this nebula cooled, rings of gas were thrown off by its rotation somewhat like the rings of Saturn. These rings were supposed to have condensed into the compact masses that we now know as planets.

This idea of the nebular origin of the planetary system was proposed in 1775 by the German philosopher, Kant. Twenty years later the great French mathematician Laplace gave the nebular theory its mathematical form.

Sir James Jeans, one of the modern contestants in this arena, has now shown that, though Laplace's nebular evolution does take place in the heavens, it is on an incomparably grander scale. The great nebulae which can be seen through powerful telescopes thousands of light-years away, do indeed evolve by a very similar process.

A small mass of hot gas such as our primeval sun must have been 3000 million years ago, could not, however, break up in this way, scientists believed till now. It could never pick up enough speed, unless the new type of motion suggested by Dr. Gunn were in operation. Jeans has also shown that a ring of gases could not under the force of its own gravitation condense into a spherical planet. For these and other reasons the grand conception of Laplace has been in the wastebasket for the last twenty years.

Other scientists, however, have not been idle. Two of these, Drs. T. C. Chamberlin and F. R. Moulton of the University of Chicago, in 1905 propounded the theory which first replaced the nebular theory—the "planetesimal" hypothesis. Accepting the idea that a single star left to itself could never have given birth to the planets, they were forced to assume that another celestial body must have cooperated in the process.

Another wandering star, they believed, must have come so close to our sun at some remote time, that by gravitational force it drew lumps and a great mass of diffused gas and small particles out from the sun. The two stars swung around each other once, like country dancers, and never saw each other again. Those stray lumps were much smaller than our present planets. But as they whirled through the debris created by the glancing collision, they gradually picked up more and more matter. The planets had then reached their present size and they moved in nearly circular orbits.

Great Tides Raised

Sir James Jeans and Dr. Harold Jeffreys of Cambridge University, England, have made further modifications of this collision theory. They believe that the new born planets were liquid and shot out from the parent practically full grown.

In Jeans' theory the two stars did not actually come into contact but passed so close that great tides were raised in the sun. These tides must have become so powerful that the gravitational pull of the sun was no longer able to hold it together. Liquid matter was ejected from the sun in a stream which subsequently broke into pieces. These condensed to form the planets as in Gunn's theory.

Dr. Jeffreys criticizes this theory, saying that tidal and gravitational forces could not have caused the rotations and revolutions that astronomers observe of the planets. Tidal disruption of the primitive sun would leave it rotating as before and the planets should now be rotating at the same speed as the sun, he holds. Actually the sun rotates in twenty-five days, while Jupiter, a planet, turns around once in ten hours.

These difficulties can be avoided, says Dr. Jeffreys, if the two suns actually collided. A glancing blow from a heavier star would have given our sun a jolt which could have produced the desired rotation. Then the new-born planets would also have been dragged around sufficiently fast by the visiting star.

Explanations of the satellites of the planets can be given on these theories, but on any theory yet devised our moon remains extraordinary and unexplained. With respect to the size of its planet, the moon of the earth is one of the largest satellites in the solar system, yet the earth is one of the smallest planets. The moon has a mass one-eightieth as great as that of the earth.

METEOROLOGY

Air Currents of North Atlantic to Be Studied

UNKNOWN air currents over the Grand Banks, which seal the fate of many unsuccessful transatlantic flyers, will be explored for the first time by scientists aboard the U. S. Coast Guard Ice Patrol boat Pontchartrain.

While relieving the Tampa of the duty of watching for and reporting icebergs near the shipping lanes, the Pontchartrain carries a representative of the U. S. Weather Bureau, a theodolite and a supply of upper atmosphere balloons. Wind direction thousands of feet above the ocean are to be observed by releasing the balloons and charting their courses with the instrument. Information obtained in this way is expected to increase the usefulness of air pilot charts of the North Atlantic.

The Weather Bureau scientist will train members of the Pontchartrain crew to make the observations and these men will replace him in future work.

Science News Letter, April 23, 1932

BOTANY

"One in Ten" Rule Urged For Picking Wild Flowers

"TAKE ONE, leave nine," was suggested as a good rule for wild flower pickers to follow, by P. L. Ricker of the U. S. Department of Agriculture, speaking on behalf of the Wild Flower Preservation Society over the network of the Columbia Broadcasting System. The talk was arranged under the auspices of Science Service.

"A safe rule to follow," said Mr. Ricker, "is that no attractive wild flower, except the well-known weedy ones, should be picked for bouquets, unless there are at least one or two hundred of them, and then pick not more than one out of ten flowers. The spring flowers that grow in the woods are also the ones most in need of protection. A much larger proportion of the summer and fall flowers grow in open fields and along roadsides, have more aggressive root and seed habits, and as a general rule, where abundant, may be picked freely with little danger of extermination."

In parts of the country still forested, fires of human origin were blamed by Mr. Ricker for much of the scarcity of wild flowers. In the West, these fires are the result of carelessness with cigarettes and campfires, but in the East and

South they are started by the woodland owners in the belief that such fires are "good for the woods" or pastures, in spite of the contrary pronouncements of practically all foresters. In other parts of the country, plowland has replaced forest to such an extent that one country-bred girl informed Mr. Ricker that she "did not believe there were any wild flowers left in Pennsylvania."

Some states have passed protective laws for wild flowers, Mr. Ricker said, but nowhere are these laws at all well enforced. He is more inclined to trust to the working of public opinion, if it is sufficiently aroused by well-planned and persistent educational campaigns through radio, press, schools and other agencies.

Science News Letter, April 23, 1932

PHYSICS

Atoms Measure Duration Of Own Excited State

AN ATOM which acts as its own stop-watch was used to measure a time interval of a hundred-millionth of a second by Dr. Louis R. Maxwell, working at the Bartol Research Foundation of the Franklin Institute.

An atom which is emitting light is in an "excited" or high-energy state. How long on the average the atom's excitement continues has been measured by this ingenious new microscopic timer.

The light-emitting helium atom itself acts as the moving hand of the watch in these experiments. Electrons moving with properly chosen speeds strike the helium atoms and make them "excited." At the same time, however, they knock an electron off the atom and thus give it an electric charge.

An electric force applied to the group of excited atoms therefore pulls the charged atoms away from the place in which they had been struck by the electrons. As the atom is still emitting light this electric deflection of the light-emitting atom can be accurately recorded on a photographic plate.

Measurement of the lengths of track left by the atom in the absence and in the presence of the electric field gave Dr. Maxwell his way of measuring the "life" of the atom in the excited state. The value obtained, a hundred-millionth of a second, agrees well with the predictions of the new quantum theory for the helium atoms employed.

Dr. Maxwell is now associate physicist of the U. S. Bureau of Chemistry and Soils at Washington.

Science News Letter, April 23, 1932

IN SCIENCE

RADIO

Greater Power in New Two-in-One Radio Tube

TWO radio tubes have been made in one in a new development introduced to the technical world at the meeting of the Institute of Radio Engineers at Pittsburgh recently.

"Triple-twin" is the descriptive name given the new device by Charles F. Stromeier of Brooklyn, N. Y., who described it. He claimed that a special circuit and the new tube will give twice the power and many times the sensitivity of the now widely-used pentode at the same plate voltage.

The internal parts of two ordinary vacuum tubes are built into the same glass casing in the new device. The first set of the usual three elements of a radio tube handles the input and the second the output.

In spite of the fact that the number of elements is doubled, there are only five terminals. Interconnection of elements within the tube reduces the number of terminals needed.

Science News Letter, April 23, 1932

ASTRONOMY

Delporte Object May Be Comet Seen Years Ago

THE HEAVENLY object discovered in March by Prof. E. Delporte, Belgian astronomer, may be the return to the solar system of the Tuttle-Giacobini comet seen in 1858 and 1907. This is suggested by Dr. A. C. D. Crommelin now that the orbit of the Delporte object has been computed. Comets known as 1858 III and 1907 III were not immediately recognized as identical.

If the Delporte object proves to be the same comet, it must have lost most of its gaseous envelopes since 1907, because it looked more like a star than a comet when first found. It was bright when first found but faded shortly thereafter, although approaching the earth and sun. It is suggested that there must have been some kind of outburst to explain its temporary brightness.

Science News Letter, April 23, 1932

NE FIELDS

ARCHAEOLOGY

Buildings Found Within Largest Mexican Pyramid

THE ANCIENT Toltec pyramid of Cholula in the state of Puebla, a tremendous structure of adobe brick and earth, is built over and around still older structures, a Mexican government archaeologist has just discovered. Exploratory tunnels now being driven into it have already revealed stone stairways and walls of stone, with mural paintings inside them. There is as yet, however, no indication of the date of their construction, or of the race who built them.

The Pyramid of Cholula has been known to Europeans ever since the Conquest of Mexico, since Cortez passed through the city on his way to the Aztec capital. Like most Mexican pyramids, it served as the foundation for a temple. This temple the Spaniards destroyed, building in its stead a chapel dedicated to Our Lady of Help. Now the pyramid is discovered to resemble other Mexican pyramids in another respect: in being built around an earlier edifice.

The Pyramid of Cholula is noteworthy among its neighbors for its great size. It is 177 feet high and covers an area of nearly 45 acres. The Pyramid of Cheops, in Egypt, is much higher—461 feet—but its basal area is only one-third as extensive.

Science News Letter, April 23, 1932

MEDICINE

Chemical Cure of Cancer Foreseen by Researcher

"A CHEMICAL cure of cancer seems only a matter of time, trouble and intelligent effort," declares Dr. Ellice McDonald of the University of Pennsylvania Cancer Research Laboratories in a report to the *Journal of Chemical Education*.

The problem of cancer should be attacked from the chemical angle, Dr. McDonald says. The cancer cell has a different set of chemical reactions from normal cells. It produces from 5 to 20 times as much lactic acid as normal cells, and it is defective in oxidative

processes, that is, in the use it makes of oxygen in its production of heat and energy. Hope of changing the chemical reactions of the cancer cell back to normal lies in the ability of scientists to find a way to repair this injury to its oxidative processes. This is the line of attack which Dr. McDonald believes will eventually bring a solution of the cancer problem.

In his report, Dr. McDonald calls attention to the enormous annual mortality from cancer. In the United States about 130,000 people die of cancer every year. In Canada during the four years of the war the cancer deaths among men and women at home were almost exactly equal to war casualties.

X-rays, radium and surgery are the only successful means at present of treating cancer. Even with them under the best conditions, only one-third of the cases, as they come to the physician or surgeon, can be cured. Actually, the total proportion of cancer cures is estimated at between 5 and 10 per cent. in this country. There is great need of active research as the total number of deaths is constantly increasing.

Science News Letter, April 23, 1932

ENGINEERING

Welding Offers Camera Striking Field of Beauty

See Front Cover

BY NO MEANS a trivial by-product of electric welding is the field of beauty the new art is opening up for photographers.

While electricity eliminates the irritating staccato of noisy riveting, the photographer focuses his camera on a glowing scene of shadow and light, man and steel. Such a picture is that reproduced on the front cover of this week's NEWS LETTER from the shops of the Westinghouse Company. The ends of a ring of steel, to be used as a "skirt" for an oil circuit breaker, are being welded.

The use of welding in erecting buildings and in making ships, bridges and machinery has been extended by the discovery of a method of increasing the strength of a welded joint. The order or sequence in which metal is applied to a joint greatly affects its security, C. H. Jennings, research engineer of the Westinghouse Company, has found. Of a number of sequences, Mr. Jennings was able to specify one 28 per cent. superior to a sequence commonly used. He also found that this advantage could be increased still more through suitable treatment with a hand tool.

Science News Letter, April 23, 1932

MENTAL HYGIENE

Nation's Mental Health Unaffected by Depression

THE ECONOMIC depression has so far had very little effect on the mental health of the nation as seen in a survey of mental disease hospitals, results of which have been made public by the National Committee for Mental Hygiene.

A questionnaire study of over a hundred of the 173 state hospitals in the country showed no marked increase in new cases. Reports from hospital superintendents varied as to the effect the depression was having, but on the whole it seems to have been very slight so far. The chief effect seems to be on paroles and discharges. In all parts of the country patients who would normally be discharged or paroled cannot be because their families are unable to care for them.

Financial worries may precipitate a mental breakdown but psychiatrists realize that there is a tendency to overemphasize the last factor that appeared before the onset of the mental disturbance. After a study of many thousands of cases they are more than ever convinced that the mental disturbances are the results of an accumulation of strains, rather than a condition produced by one particular factor, such as financial worry or unemployment.

The National Committee for Mental Hygiene takes a hopeful view of the future, pointing out that the depression has been notable for the absence of violent mass behavior and that the average man and the average family have borne up heroically under the terrific pressure.

"This is a tribute to the essential sanity of America," declared Dr. C. M. Hincks, general director of the organization. "Fundamentally and ultimately the mind of America is sound."

Science News Letter, April 23, 1932

MANUFACTURING

New Use of Soy Bean Oil May Save Millions Yearly

RAW soy bean oil can be used in making foundry cores, allowing a saving of half of the cost of oils now used, Prof. C. H. Casberg and Carl E. Schubert of the University of Illinois have announced after months of research. This opens a potential market of ten to fifteen million gallons of soy bean oil and a saving of \$4,000,000 or more a year to manufacturers of castings.

Science News Letter, April 23, 1932

INVENTION

Which Was the First Steamboat?

"A Classic of Science"

Would These Early Inventors Have Been More Successful If They Had Experimented More and Quarreled Less?

Rumsey

A SHORT TREATISE ON THE APPLICATION OF STEAM, whereby is clearly shewn, from Actual Experiments that Steam may be applied to propel Boats or Vessels of any burthen against rapid currents with great velocity. . . . By James Rumsey. Philadelphia. Printed by Joseph James, M.DCC, LXXXVIII (1788).

THOSE who have had the good fortune to discover a new machine, or to make any material improvements on such as have been already discovered, must lay their account to encounter innumerable difficulties; they must arm themselves with patience to abide disappointments; to correct a thousand imperfections (which the trying hand of experience alone can point out) to endure the smarting shafts of wit, and what is perhaps more intolerable than all the rest put together (on the least failure of any experiments) to bear up against the heavy abuse and bitter scoffs of ill-natured ignorance. These never fail to represent the undertaker as an impostor, and his motives the most knavish. Happy for him if he escape with so gentle an appellation as that of a madman.

This is the fate of the unlucky projector, even in the cities of Europe, where every material is at his command, and every artificer at his service. A candid public will then consider my situation, thrown by hard fate beyond the mountains, and deprived of every advantage which that grand mover, money, produces. They will easily perceive how my difficulties have been multiplied, which is the only reason of my not exhibiting my long promised BOAT before this; and which I hope will be a sufficient apology. Even now, these difficulties render my machinery very incomplete; but Mr. Fitch's endeavouring to procure patents for his boat, by uncandidly representing, to the different Assemblies, that my boat had nothing to do with steam, although he had been

informed that I was before him, both in the idea and the application of steam, and he had actually procured an exclusive right from two respectable Assemblies, who had granted me the same in the year 1784, before I was aware what he was about; such treatment obliged me, circumstanced as I was, to make an experiment, in order to secure to myself my own discovery, by shewing my principles, as Mr. Fitch's conduct gave me reason to fear that he would adopt my plan, as soon as he found his abortive. And my machine, with all its misfortunes upon its head, is abundantly sufficient to prove my position; which was, "that a boat might be so constructed, as to be propelled through the water at the rate of ten miles in an hour, by the force of steam; and that the machinery employed for that purpose, might be so simple and cheap, as to reduce the price of freight at least one-half in common navigation; likewise, that it might be forced, by the same machinery, with considerable velocity, against the constant stream of long and rapid rivers.

Such a machine I promised to prepare, and such a boat to exhibit; this I have now so far performed, in the presence of so many witnesses, and to the satisfaction of so many disinterested gentlemen, as to convince the unprejudiced, and deprive even the sceptic of his doubt. . . .

Fitch

THE ORIGINAL STEAM-BOAT SUPPORTED; or, A Reply to Mr. James Rumsey's Pamphlet, shewing the True Priority of John Fitch, and the False Datings, &c. of James Rumsey. Philadelphia: Printed by Zachariah Poulson, M DCC LXXXVIII (1788).

Preface

AGREEABLY to a promise made in the Independent Gazetteer, I now present to the Public a reply to the Pamphlet published by Mr. Rumsey, of Virginia,—and as I have no matter to conceal, or disguise, and wish my Readers to have a full and fair view of

the whole controversy, I have reprinted and annexed Mr. Rumsey's Pamphlet, which will discover, to every impartial person who will take the trouble to examine the subject, that he hath no sort of just pretensions to the claims he hath exhibited.—His skill in the mechanism of a Steam Engine, may possibly be greater than mine, and in the article of *Condensation* I freely acknowledge he is my superior, having acquired the art of *condensing* (with the dash of his pen) one whole year into the compass of six days.

JOHN FITCH.

Philadelphia, 10th. May, 1788.

It is the duty of every man not only to avoid the commission of a crime, but so to conduct himself through life as to bear the strictest scrutiny.

In a Pamphlet published by Mr. James Rumsey and lately circulated in this city, as well as probably in other States, I am charged as the perpetrator of crimes atrocious in their nature, but of which my conscience fully acquits me. It is an exercise of malevolence in the extreme thus publicly to prefer charges against an innocent person without previously knowing or enquiring for the defence of the supposed offender, and shows an inability in the accuser to support his charges. Unfortunately for Mr. Rumsey, I trust we are now before an impartial Public, where Justice, unbiassed by party or undue influence, will decide between us—Conscious of my conduct, in the prosecution of this business, being that of an honest man, it is incumbent on me to recite the circumstances, and facts relative thereto.

I confess the thought of a Steamboat, which struck me by mere accident, about the middle of April 1785, has hitherto been very unfortunate to me; the perplexities and embarrassments through which it has caused me to wade, far exceed any thing, that the common course of life ever presented to my view. After pondering some days on the thought, I made a rough draught, but not daring to trust my own opinion too far, I consulted Mr. Daniel Longstreth, the Revd. Nathaniel Irvin and sundry other Gentlemen of Bucks county Pennsylvania.

About the beginning of June 1785,

I went to Philadelphia and shewed it to Dr. Ewing, Mr. Patterson and other respectable characters in the city, from whom I met with no discouragement. In June and July I formed models and in August laid them before Congress, as will appear on their files. In September I presented them to the Philosophical Society, as per certificate. . . .

From Lancaster I went to the Assembly of Virginia, first waiting on Governor Johnson, of Maryland, who, notwithstanding the letters he has since written in favour of Mr. Rumsey, acknowledged a merit in my invention, and that it ought to be encouraged, as will presently appear. During my journey through Maryland, in October, I passed through Frederick Town, and every where published my Plan. In Virginia I waited on his Excellency General Washington, who, in the course of conversation, informed me, that the thought of applying steam was not original, that Mr. Rumsey had mentioned Steam to him; but nothing that passed in the conversation with General Washington had the least tendency to convey the idea of Mr. Rumsey's relying on Steam, and General Washington's letter, page 10, in Mr. Rumsey's Pamphlet, clears up the matter—for the General himself did not conceive any such thing. Knowing that the thought of applying Steam to Boats had been suggested by other Gentlemen long before, I left his Excellency General Washington with all the elated prospects that an aspiring projector could entertain, not doubting but I should reap the full benefit of the project, for although I found that *some* had conceived the thought before, yet I was the first that ever exhibited a plan to the public; and was fully convinced that I could not interfere with Mr. Rumsey, otherwise the known candor of General Washington must have pointed out to me such interference. I immediately applied to the Legislature of Virginia for assistance, to execute my plan, who signified their wish to encourage

my designs, but that the state of their finances prevented it—the then Governor of the state, Patrick Henry, Esqr., received from me an obligation with provision, that if I procured in that state a sale for one thousand of my Maps of the N.W. part of the United States, at 6/8 each, I should exhibit a Steam Boat on the waters of Virginia, within nine months or forfeit and pay to the State of Virginia £350. . . .

Rebuttal for Mr. Rumsey

REMARKS ON MR. JOHN FITCH'S REPLY TO MR. JAMES RUMSEY'S PAMPHLET. By Joseph Barnes, formerly assistant, and now attorney in fact to James Rumsey. Philadelphia: Printed by Joseph James, M,DCC,LXXXVIII (1788).

MR. RUMSEY, before his late departure for England, by an advertisement, begged the candid public to suspend their opinion respecting the controversy between him and Mr. Fitch, until time should be afforded to state his claim, and answer such objections as should occur, from a pamphlet which Mr. Fitch then had in the press, but had not appeared before he left this city.

Since that time Mr. Fitch has been busily employed in traducing Mr. Rumsey's character, and endeavouring to establish in the public mind an opinion, that Mr. Fitch was the first person who actually attempted to apply the force of steam to the purposes of navigation. If this assumption was admitted, which however will be fully disproved, nothing would thence follow prejudicial to Mr. Rumsey's claims; for it will appear from a cloud of testimony, that although both of them entertained the idea of applying the force of steam to the purposes of navigation, their modes of effecting it were as different from each other as possible. Mr. Fitch proposed to apply the action of steam by a number of cranks to oars or paddles; Mr. Rumsey thought of the force of reaction on the fore part of the boat by a column of water forced through a trunk in the body of it. That Mr. Fitch originally entertained no other idea than applying the force of steam to the working of paddles, will abundantly appear from his repeated models and experiments; from the plan published in the magazine, taken from a draught sent to the proprietors of that publication by Mr. Voight; and from his public declarations that Mr. Rumsey's scheme could not be made effectual. That Mr. Rumsey had a different mode of applying the force of steam to



ANCESTORS OF THE LINER

Fitch's boat had a row of oars on each side, which were rowed by a steam engine. Rumsey's boat, above, had a cylinder called the "trunk" running longitudinally through the hull, from which water was squirted out at the stern. (Photographs of models in the U. S. National Museum.)

navigation, is sufficiently apparent, not only from his publications on the subject, but from his apparatus now in this city, which was fitted between two and three years ago, and was last year actually applied to the purpose on the river Potomac, and produced the desired effect, by propelling a boat, with a burthen of three tons on board, at the rate of four miles an hour, against the stream of that river.

An Attempt at Witticism

In order to destroy Mr. Rumsey's character and views, which Mr. Fitch has thought dangerous to his interests (altho' fortified by an extraordinary act of assembly) he has published a pamphlet containing a variety of depositions and certificates, tending to show that Mr. Rumsey has anticipated a whole year, and by an attempt at witticism, has acknowledged his powers of condensation in this respect. That Mr. Rumsey's narration of facts is true, will be proved (if further proof was necessary) by the several certificates and depositions hereto annexed, to which the reader is referred; but this is not the immediate object of the present publication: Mr. Rumsey had in the year 1785 prepared a steam-engine upon the plan used and improved in Europe, to propel his boat, but was prevented by the frost from exhibiting it that fall; being thus prevented, he employed himself during the ensuing winter in projecting more easy

A Second or a Thousand Years?

the late

Dr. Wilhelm Ostwald

Nobel prizeman, physicist and physical chemist, shows that chemical combinations obey the laws of energy change but independently of time, in the next

CLASSIC OF SCIENCE

methods of producing the like effects; and by experiment he discovered a mode of generating steam so effectual as to promise very great advantages to the inventor. To bring this invention to act on his former machinery, required some time, which was employed in perfecting it; several experiments were accordingly made, and in the end Mr. Rumsey's principles were proved to be good. During this time Mr. Arthur Donaldson, a very ingenious mechanic (whether from the strength of his own genius, or from hearing something of Mr. Rumsey's scheme, is not material in this dispute with Mr. Fitch to ascertain) took up the idea, and made several experiments, which fully proved that the reaction of a column of water, forced with rapidity from the stern of a boat, would propel her forward so as to answer the end required for navigation. Mr. Donaldson communicated his ideas and experiments to many gentlemen in Philadelphia, who were satisfied of his principles, but they doubted whether the size of a boiler, and the quantity of fuel necessary to keep it heated, would not occupy so large a part of the boat as to render her freight of no value: to reduce this to a certainty, gentlemen acquainted with Steam-engines in Europe, were consulted, and their opinions confirmed the doubts entertained, so that Mr. Donaldson gave up the idea of prosecuting his scheme. While Mr. Donaldson was employed in experiments, Mr. Fitch had applied to the assembly of Pennsylvania, for the exclusive privilege of navigating by the force of steam, and was opposed before a committee of the house by Mr. Donaldson, when Mr. Fitch claimed all possible modes, whether *invented or to be invented by himself or others*, of using steam for that purpose; and as Mr. Donaldson, before a report was made by the committee to the house, was convinced by his friends that no boiler *then known* would generate steam in a sufficient quantity and at a cheap rate, to answer the end, he declined his opposition, and a grant was made to Mr. Fitch, of the exclusive use of steam for navigation, in very large and comprehensive words. Since this grant Mr. Fitch, and a large company, who associated with him, have made many experiments to reduce their boat to practice; all of which were to apply the force of steam (generated in a large boiler, agreeably to the old practice long used in Europe) to the working a

number of paddles on the sides of the boat, the abortive events of which have been too public to need repetition.

[Those who wish to follow this controversy in detail will find these three rare pamphlets reprinted in full in "The Magazine of History with Notes and Queries," extra numbers 100 (1924), 122 (1926) and

139 (1928). Both inventors tried to obtain money to build boats for complete tests. They had the interest of most of the famous men of their time, but were unable to carry out their plans. Rumsey died broken-hearted, Fitch committed suicide. Yet both men had actually run their steam-propelled boats upstream on swift rivers. Thus the steamboat dates from the Eighteenth Century.]

Science News Letter, April 23, 1932

PHYSIOLOGY

Scientist Traces Evolution Of Firefly Light Reaction

Finds Special Ability Has Developed From One of Biochemical Processes Underlying Ordinary Respiration

ORGANISMS that shine in the dark, like fireflies, and the bacteria that cause the light of "punkwood" or "fox-fire," have evolved this special ability from one of the biochemical reactions that underlie ordinary respiration. Reasons in support of this view were presented before the opening session of the American Philosophical Society's annual meeting by Prof. E. Newton Harvey of Princeton University.

Prof. Harvey, who has been working on the problems of "living light" for many years, traced a close parallelism between the reaction of the glowing substance "luciferin" and oxygen, brought about by the enzyme "luciferase," and the "hydrogen acceptor" mechanism involved in the oxidation of food substances to set free energy in common non-luminous forms. The outstanding difference between the two processes is that in ordinary oxidation the end-product is carbon dioxide, whereas in the light-producing reaction this substance is not set free. Instead, the oxygen involved seems to be tied to hydrogen atoms to form water, and the oxidized luciferin is later caused to lose its oxygen and thus be ready for use all over again.

Luminescence is a capacity possessed by many organisms scattered all over the evolutionary family tree; which leads Prof. Harvey to believe that the shift-over from ordinary respiration to the special case of luminescence has occurred many times, and is not confined to any one line of descent.

There are two main modes of luminescence; continuous glow, exhibited by bacteria, and intermittent glow, exhibited by practically all other organisms.

The intermittent type is the one most familiar to the majority of people; it is well exhibited by the common firefly. Intermittent luminescence ordinarily takes place only in response to a stimulus. It may serve an evolutionary end, such as scaring off enemies or attracting prospective mates. The anatomical mechanisms for its production are often quite complex.

The continuous glow of bacteria is emitted without stimulus and apparently serves no useful purpose to the organisms that display it. It seems to be produced simply by the secretion of luciferin within the bacterium's body, and the oxidation of this luciferin when it makes contact with the air.

Science News Letter, April 23, 1932



The Science Service radio address next week will be on the subject of

A WORLD OF PARASITES

Dr. Maurice Hall

prominent parasitologist of the U. S. Department of Agriculture, will be the speaker.

FRIDAY, APRIL 29

at 1:45 P. M., Eastern Standard Time

Over Stations of The Columbia Broadcasting System

The Public's Way to Science

SCIENCE SERVICE is the unique institution established for the purpose of disseminating scientific information to the public. It acts as a liaison agency between scientific circles and the world at large. It interprets original research and reports the meetings of learned societies in a way to enlighten the layman. The specialist is likewise a layman in every science except his own and he, too, needs to have new things explained to him in non-technical language. Scientific progress is so rapid and revolutionary nowadays that no one can keep up with it without some means of keeping in close contact with its new ideas and discoveries. Science Service provides life-continuation courses in all the sciences for newspaper readers without tuition fees or entrance examinations.

In a democracy like ours it is particularly important that the people as a whole should so far as possible understand the aims and achievements of modern science, not only because of the value of such knowledge to themselves but because research directly or indirectly depends upon popular appreciation of its methods. In fact the success of democratic institutions, as well as the prosperity of the individual, may be said to depend upon the ability of people to distinguish between science and fakes, between the genuine expert and the pretender.

Science Service spares no pains or expense in the endeavor (1) to provide the best possible quality of science popularization (2) to get it to the largest possible number of people. If in doing this it makes both ends meet, so much the better. If not, it does it anyway.

Through the endowment by the late E. W. Scripps, Science Service has been assured of such financial support as to insure its independence and permanence. Mr. Scripps' long and wide experience as a newspaper editor and proprietor convinced him of the importance of scientific research as the foundation of the prosperity of the nation and the guide to sound thinking and living. He realized the need for an independent agency that would bring the results of research to the attention of the entire people so these could be applied to the solution of their personal, social or political problems.

Science Service was organized in 1921 as a non-profit-making corporation. Science Service is conducted on busi-

ness principles and all receipts are devoted to the diffusion of knowledge and the developing of promising methods of popular education.

Science Service is under the control of a board of trustees composed of nine scientists and six journalists. The leading national organizations of all the sciences, the National Academy of Sciences, the National Research Council, and the American Association for the Advancement of Science, appoint three trustees each.

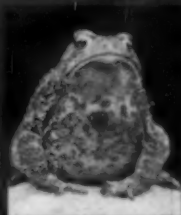
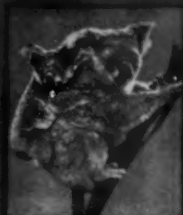
Science Service enjoys the cooperation of scientists and scientific institutions throughout the world. It welcomes suggestions and information. Although not a medium for the primary publication of original research, Science Service desires to receive copies of research reports, addresses and papers. When communication is urgent, any scientist is authorized to telegraph Science Service, Washington, D. C., using press rate collect.

Science Service invites editors of newspapers, magazines and other publications to avail themselves of its product. It invites individuals of the public to cooperate by reading the newspapers and other publications using Science Service. Teachers, students, and individuals specially interested in science are invited to subscribe for the SCIENCE NEWS LETTER and utilize Science Service records and other services that may be made available.

For feeling and reporting the pulse of science day by day, Science Service has a staff of scientist-writers at its headquarters in Washington. Science Service contributors of scientific competence are located in the centers of research in America and abroad. The principal national and international science meetings here and abroad are reported by staff or other scientist-writers. A working information file and library provides quickly the necessary background to the current happenings in science.

Science Service occupies offices in the magnificent building of the National Academy of Sciences and the National Research Council, opposite the Lincoln Memorial, in Washington.

Science Service is not under the control of any clique, class or commercial interest. It is not under the control of any particular publisher or syndicate. It is not a governmental institution, but it is in close contact with the num-



erous governmental bureaus of research. It is not the organ of any single scientific association. It serves all the sciences. It engages in no propaganda, unless it be called propaganda to urge the value of research and the usefulness of science.

In fulfilling its function as the institution for the popularization of science, Science Service operates as a news-

paper syndicate specializing in the field of science, provides science copy to other newspaper agencies, edits books for publishers, provides science articles for magazines, publishes the *SCIENCE NEWS LETTER*, arranges radio programs, sponsors lectures, produces phonograph records on science, and sponsors research and reporting in the field of seismology, archaeology and cosmic data.

The Activities of Science Service

Newspaper Services

Daily Mail Report—A daily syndicated service to newspapers, consisting of brief non-technical news articles on discoveries, inventions and events in the various fields of science, with special reference to their application to industry, commerce and daily life.

Daily Wire Report—Spot news such as new inventions and discoveries, earthquakes, comets, explorations, etc., and the meetings of the larger scientific societies here and abroad are covered by dispatches telegraphed daily to newspapers.

Interpretive Articles—Short, concise articles, interpretive of science today and suitable for editorial or feature page use are issued thrice weekly.

Science Shorts—An assortment of interesting and authoritative short items on science, old and new, issued as a daily feature or for use as fillers.

Feature Series—Sequences of six to ten articles on important and timely subjects, written by eminent scientists or staff writers. Recent subjects of these feature series include: The fight against drugs, Manchurian backgrounds, depression diets, the next greatest invention, etc.

Map of the Stars—A monthly chart of the heavens which enables the layman to understand and enjoy the beauties of the night sky. Descriptive text accompanies map which is furnished in matrix form.

Preparedness—A preparedness file or "science morgue" is supplied each newspaper using Science Service. This contains authoritative background stories that the course of the news may at any moment make timely.

(The seven newspaper services listed above are supplied newspapers as a unit 7-in-1 service and constitute a complete and authoritative coverage of current science.)

Why the Weather—A daily series of brief authoritative explanations of meteorological phenomena, syndicated to newspapers.

Feature Articles—A weekly Science Service release of a newspaper feature article illustrated with photographs and

drawings is distributed as a part of Every-Week Magazine for Sunday newspapers.

Special Newspaper Features—Important events of a scientific nature, such as eclipses, expeditions, explorations, etc., are covered for newspapers in special articles distributed by mail and telegraph.

Other Syndicate Features—Other newspaper features are offered from time to time, either produced by the Science Service staff or in cooperation with outside authors.

Books, Radio, Records

Radio—Each Friday afternoon under the auspices of Science Service an eminent scientist talks over the nation-wide network of the Columbia Broadcasting System. Each week more than fifty independent radio stations use a science news talk prepared by Science Service. Science Service has been engaged in the presentation of radio talks on science continuously since the early days of broadcasting.

Phonograph Records—As a new educational tool, Science Service has introduced phonograph records of talks by eminent scientists. These records are long playing, faithful reproductions of the voice and are furnished teachers and others at a cost that should allow their wide use.

Books—Science Service is engaged in writing, editing, revision and criticism of manuscripts for many publishers.

Magazine Articles—Science Service is prepared to supply periodicals of any kind with readable and accurate articles on scientific subjects, written either by its staff or the investigators themselves in any specified style and length and illustrated if desired.

Photographs—Science Service carries in stock for immediate mailing to individuals and newspapers portraits of men and women working in science and a large collection of other scientific photographs.

Research Activities

Seismological Reporting—Instrumental data upon earthquakes recorded at more than thirty seismological stations through-

out the world are collected telegraphically by Science Service. These are made available to the U. S. Coast and Geodetic Survey and the Jesuit Seismological Association for the prompt determination of the epicenter and for further investigation use.

Cosmic Data—Science Service receives daily reports from Mt. Wilson Observatory on sunspots, from the U. S. Coast and Geodetic Survey observatory at Tucson, Ariz., on magnetic conditions, from Smithsonian Institution on solar constant, from College of Agriculture and Mines, College, Alaska, on aurora, and from U. S. Bureau of Standards on Kennelly-Heaviside layer heights. These are transmitted by U. S. War Department radio to Science Service, assembled into an ursigram message and distributed by U. S. Navy radio throughout the world.

Archaeological Investigations—Leading archaeologists, anthropologists and geologists throughout the country constitute a corps of "minute men" who investigate for Science Service reported archaeological and anthropological discoveries. In this way authentic information on important finds is made available to the public and erroneous reports are corrected.

Research Announcements—The results of Science Service research activities are summarized in mimeographed research announcements issued as necessary and sent gratis to cooperating scientists.

Science News Letter

Each week the current progress of science is summarized in the fully illustrated pages of this concise, easily read and authoritative magazine. It is a quickly read story of what is newest in science. Rarely more than 16 pages large, it restricts the size of its articles to save the time of its readers. It reprints classics of science, reviews new books and serves scientists and non-scientists alike. Its subscription price is \$5 a year, special introductory offer, 17 weeks for \$1.

Address: Science Service, 21st and Constitution Avenue, Washington, D. C. Watson Davis, Managing Editor.





A Miner for Worms

JUST how many infuriated householders there are in the land at present, each cursing his pet mole and all his earthworks, is hard to say; but there are probably plenty of them. For wherever man has gone, and made lawns and planted gardens, he has found moles to work havoc among them.

At that the poor mole is not intentionally a despoiler of crops. His favorite food is worms, and if the misguided worms insist on patronizing cultivated ground, that is a pity, hardly to be helped. So the mole thrusts in his streamline nose, gouges with his trowel feet, and plows up another yard or two. And the householder sees molehills as large as mountains.

The American mole's works are hardly to be dignified with the name of molehills. They are really only incidental heaps of loose earth, thrown out of the tunnel at intervals, when the accumulated debris has become too much of a nuisance. The true molehill, as constructed by the European mole, is more in the nature of a permanent dwelling, with interconnecting galleries, and burrows leading out, partly as "get-aways" in case of an enemy raid, partly as highways to the individual diggings. The American mole is an individualist, and does not take to communal life.

Contrary to the common proverb, moles are not blind. Their sight is dim, to be sure, and they are helpless and bewildered when caught above ground, but they do have a pair of tiny, beady eyes, almost invisible in their fur. As dwellers in the dark, they depend more on their highly developed sensitiveness to vibration than on sight.

Science News Letter, April 23, 1932

ARCHAEOLOGY

Ancient Sun-Hole Device Added to Famous Calendars

A PREHISTORIC sun-hole calendar, in the Casa Grande Indian ruins, should take rank with world-famous calendars of ancient times, declares Robert H. Rose, Park Naturalist of the National Park Service.

Investigations indicate that long before the discovery of America, the Indians of Casa Grande reckoned time by sun-holes. In the mud walls of the Casa Grande watch tower are two of these holes, so placed that at certain times of the year the sun rising over a distant mountain crest comes into line with the holes.

The days of this phenomenon are March 7 and October 7 in all years except leap years, when it occurs a day earlier. The light striking the holes passes through the east wall and across the ten-foot width of a room. Thence it passes through another thick wall and

across the ten-foot width of the inner tower wall to a point on a third wall.

So, for about eight minutes, shortly after sunrise on these two dates, the gleam of light appears on the third wall, having been carried by the holes through eight feet of masonry wall and twenty feet of room space.

Timed Harvest Festivals

It is believed that the prehistoric Indians timed their planting ceremonies and harvest festivals by this method of watching the sun. The buildings containing the sun-hole calendar were abandoned by their inhabitants some six hundred years ago.

Mr. Rose ranks the sun-hole calendar of the Southwest with famous devices for reckoning time by the sun known to the Egyptians, the Mayan Indians, and the ancient Britons.

Science News Letter, April 23, 1932

EXPLORATION

Shrunken Heads of Sloths Are Trophies of Expedition

BRINGING shrunken sloth heads and other articles collected from jungle tribes of South America, the Latin-American Expedition, Inc., is making ready to sail from Guayaquil to New York, according to a cabled report received at the Smithsonian Institution.

The message was dispatched from Lima by Matthew W. Stirling, chief of the Bureau of American Ethnology, who is in charge of scientific investigations of the expedition. Mr. Stirling expects to arrive in Washington about May 1.

In a longer communication sent by mail, Mr. Stirling reports that part of his collection was lost at the Pongo de Manseriche. This is a river gorge noted for its rapids and its other hazards. For the most part, however, he was able to bring the collections through in good shape, despite difficulties of transport.

Many of the scientific specimens obtained by Mr. Stirling and his associates

are articles used by the famous head-hunting tribe, the Jivaros of Ecuador. Others are from a related tribe, the Aguaruna. The collection includes feather and beetle-wing headdresses, drums and other musical instruments, blowguns, shields, looms and textiles, pottery, and shrunken sloth heads.

The animal heads are taken and shrunken by the Jivaros in the same manner that they shrink the heads of their enemies. Sloths are looked upon by the Jivaros as once having been human beings. Consequently they are still Jivaros in animal form, but Jivaros of a foreign tribe and therefore enemies. A shrunken sloth's head is believed to give its possessor power and other good fortune, as does the head of a human enemy.

The expedition's journey involved an eight hundred mile trip by raft down stream.

Science News Letter, April 23, 1932

• Booklists of the A. A. A. S.

Following is a continuation of the booklists of the American Association for the Advancement of Science, compiled by Joseph L. Wheeler, chairman of the Association's booklist committee. Previous installments of this list have appeared in the *SCIENCE NEWS LETTER* for March 12 and April 2; others will be printed at short intervals. The lists as printed here have been changed slightly from their original form, to include important new publications. The full set of twenty-seven annotated lists can be obtained by sending thirty cents in stamps to the American Association for the Advancement of Science, Smithsonian Institution, Washington, D. C.

Mathematics for Laymen

General Works

Whitehead, A. N. An introduction to mathematics 256p. 1927 new rev. ed. Holt \$1.25.

Bell, E. T. The queen of the sciences 138p. 1931 Williams & Wilkins \$1.00.

Dantzig, Tobias Number; the language of science 250p. 1930 Macmillan \$3.50.

Keyser, C. J. Mathematical philosophy 466p. 1922 Dutton \$3.00.

Mathematical Recreations

Ball, W. W. R. Mathematical recreations and essays 366p. 10th ed. 1928 Macmillan \$3.50.

Dudeney, H. E. The Canterbury puzzles, and other curious problems 255p. 3d ed. 1929 Nelson \$1.50.

Jones, S. I. Mathematical wrinkles 371p. 5th ed rev. and enl. 1930 Jones \$3.00.

History and Biography

Sanford, Vera A short history of mathematics 401p. 1930 Houghton Mifflin \$3.25.

Turnbull, H. W. Great mathematicians 128p. 1929 Methuen 3 sh. 6d.

Textbooks

Palmer, C. I. Practical mathematics for home study 493p. 2d ed. rev. 1931 McGraw-Hill \$4.00.

Wentworth, G. A. and Smith, D. E. Complete arithmetic 478p. 1909 Ginn \$96.

Betz, William Algebra for today First course 472p. 1929 Ginn \$1.32 Second course 502p. 1931 Ginn \$1.36.

Smith, D. E. Essentials of plane and solid geometry 504p. 1923 Ginn \$1.60.

Hayn, J. J. H. A geometry reader 320p. 1925 Bruce \$1.80.

Griffin, F. L. Introduction to mathematical analysis 512p. 1921 Houghton Mifflin \$2.75.

Chemistry of Today

Chemistry in the World's Work

Slosson, E. E. Creative chemistry 341p. new & rev. ed. 1930 Century \$3.50.

Darrow, F. L. The story of chemistry 528p. new rev. ed. 1930 Bobbs-Merrill \$5.00.

Sadtler, S. S. Chemistry of familiar things 342p. 6th ed. rev. & enl. 1930 Lippincott \$3.00.

Howe, H. E. Chemistry in industry 764p. 2d ed. 2v. 1924-25 Chemical Foundation, Inc. each \$1.00.

Little, A. D. The handwriting on the wall 287 p. 1928 Little, Brown \$2.50.

Deming, H. G. In the realm of carbon 365p. 1930 Wiley \$3.00.

Kendall, James At home among the atoms 318p. 1929 Century \$3.00.

Beery, Pauline Stuff; the story of materials in the service of man 504p. 1930 Appleton \$5.00.

Howe, H. E. Chemistry in the world's work. 244p. 1926 Van Nostrand \$3.00.

Findlay, Alexander Chemistry in the service of man 355p. 4th ed. rev. & enl. 1931 Longmans \$2.50.

Howe, H. E. and Turner, F. M., Jr. Chemistry and the home 355p. 1927 Scribner \$1.50.

Beery, Pauline Chemistry applied to home and community 534p. 2d. ed. 1926 Lippincott \$3.50.

Parsons, T. R. The materials of life; a general presentation of biochemistry 288p. 1930 Norton \$3.00.

Chamberlain, J. S., ed. Chemistry in agriculture 384p. 1926 Chemical Foundation, Inc. \$1.00.

Stieglitz, J. O., ed. Chemistry in medicine 757p. 1928 Chemical Foundation, Inc. \$2.00.

Riegel, E. R. Industrial chemistry 649p. 1928 Chemical Catalog Co. \$9.00.

History and Biography

Jaffe, Bernard Crucibles; the lives and achievements of the great chemists 378p. 1930 Simon & Schuster \$5.00.

Holmyard, E. J. Makers of chemistry 314p. 1931 Oxford Univ. Press \$2.50.

Moore, F. J. A history of chemistry 324p. 2d ed. 1931 McGraw-Hill \$3.00.

Harrow, Benjamin Eminent chemists of our time 471p. 2d. ed. enl. 1927 Van Nostrand \$3.00.

Curie, Mme. M. S. Pierre Curie; tr. by Charlotte and Vernon Kellogg 242p. 1923 Macmillan \$2.25.

Texts, Elementary

Black, N. H. and Conant, J. B. Practical chemistry 521p. rev. ed. 1930 Macmillan \$1.80.

McPherson, William, and others. Chemistry for today 588p. 1930 Ginn \$1.80.

Brownlee, R. B., and others. First principles of chemistry 809p. rev. ed. 1931 Allyn \$1.80.

Texts, More Advanced

Timm, J. A. An introduction to chemistry 561p. 1930 McGraw-Hill \$3.50.

Findlay, Alexander The spirit of chemistry 480p. 1930 Longmans \$3.75.

Kendall, A. J. General chemistry; a cultural course based upon the texts of the late Alexander Smith 676p. 1927 Century \$3.50.

McPherson, William and Henderson, W. E. A course in general chemistry 702p. 3rd ed. 1927 Ginn \$3.40.

Earth and its Wonders

General Works

Lee, W. T. Stories in stone 226p. 1926 Van Nostrand \$3.00.

Bradley, J. H. Parade of the living 308p. 1930 Coward-McCann \$3.00.

Mather, K. F. Old mother earth 177p. 1923 Harvard Univ. Press \$2.50.

Merriam, J. C. The living past 144p. 1930 Scribner \$2.00.

Mather, K. F. Sons of the earth 272p. 1930 Norton \$3.50.

Agar, W. M., comp. Geology from original sources 527p. 1929 Holt \$3.75.

Special Aspects of Earth History

Coleman, A. P. Ice ages, recent and ancient 296p. 1926 Macmillan \$3.50.

Science News Letter will secure for its subscribers any book or magazine published in the United States. Send check or money order to cover regular retail price (\$9 if price is unknown, change to be remitted) and we will pay the postage. Address: Library, Science Service, 21st and Constitution Avenue, Washington, D. C.